GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

Project No. E-24-605 GTRI/~~XXX~~ DATE 10/15/82

Project Director: James J. Swain School/~~Lab~~ ISyE

Sponsor: NSF

Type Agreement: Grant No. ECS-8206498

Award Period: From 10/1/82 To 3/31/84 (Performance) 6/30/84 (Reports)

Sponsor Amount: Total Estimated: $10,000 Funded: $ 10,000 (fixed amount)

Cost Sharing Amount: $ 100 Cost Sharing No: E-24-312

Title: New Engineering Faculty Research Incentive: Control Variate Methodology Applied to Nonlinear Regression with General Error Distributions

ADMINISTRATIVE DATA

OCA Contact Linda H. Bowman x4820

1) Sponsor Technical Contact:

Abraham H. Haddad
NSF
Washington, DC 20550
(202) 357-9618

2) Sponsor Admin/Contractual Matters:

Hugh Lee Lyon
NSF
Washington, DC 20550
(202) 357-9602

Defense Priority Rating: none

Military Security Classification: none
(or) Company/Industrial Proprietary: _____

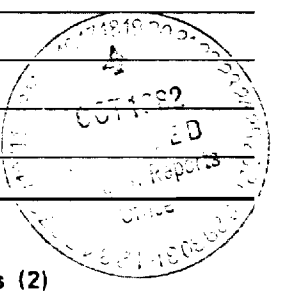
RESTRICTIONS

See Attached n/a Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with GIT; but none proposed.

COMMENTS:



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Other _____

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 10/28/86

Project No. E-24-605 School/~~Lab~~ ~~XXX~~ ISYE

Includes Subproject No.(s) N/A

Project Director(s) J. J. Swain GTRC /~~GIT~~ ~~XXX~~

Sponsor NSF

Title New Engineering Faculty Research Incentive: Control Variate Methodology Applied to Nonlinear Regression with General Error Distributions

Effective Completion Date: 3/31/84 (Performance) 6/30/84 (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [ ] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [X] Final Report of Inventions – Questionnaire sent to P.I.
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

Continues Project No. Continued by Project No.

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Other I. Newton
A. Jones
R. Embry

NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

FINAL PROJECT REPORT
NSF FORM 98A

PLEASE READ INSTRUCTIONS ON REVERSE BEFORE COMPLETING

PART I–PROJECT IDENTIFICATION INFORMATION

1. Institution and Address	2. NSF Program	3. NSF Award Number
Georgia Institute of Technology 225 North Ave. Atlanta, GA 30332	NEFRI	ECS-8206498
	4. Award Period From 10/1/82 To 3/31/84	5. Cumulative Award Amount $10,000

6. Project Title
Control Variate Methodology Applied to Nonlinear Regression with General Error Distributions

PART II–SUMMARY OF COMPLETED PROJECT *(FOR PUBLIC USE)*

NEFRI Final Report

This work studies the implementation of Monte Carlo control variate strategies developed in Swain (1982) and extended to the case of nonnormal errors. Two strategies are employed to obtain the control variate approximators: linear controls based on the original, non-normal errors can be used, or the errors can be normalized by an inverse transformation, and controls based upon the normalized errors. The strategy that works best depends upon the error distribution. For instance, sampling with gamma errors works best with the normalized controls, while uniform errors worked best when the controls are based on untransformed variates. The choice of the control seems to be determined by the range of the parameter estimator, since an unbounded estimator such as occurs with gamma errors leads to the control based upon normalized errors, while the bounded estimator based on the uniform leads to the untransformed control.

The general relation between sampling efficiency and average nonlinearity, quantified through the Beale measure of average nonlinearity, is observed. This relation is identified in Swain (1982) for the case of normal errors. In addition, Beale's measure, computed using the expression by Box (1971), tracked the observed performance of an empirical measure using the sampled values of the approximators. The related question of an optimal transformation for linear controls is left open, but preliminary work suggests that further improvement is possible.

PART III–TECHNICAL INFORMATION *(FOR PROGRAM MANAGEMENT USES)*

1. ITEM *(Check appropriate blocks)*	NONE	ATTACHED	PREVIOUSLY FURNISHED	TO BE FURNISHED SEPARATELY TO PROGRAM	
				Check (√)	Approx. Date
a. Abstracts of Theses					
b. Publication Citations				√	12/84
c. Data on Scientific Collaborators					
d. Information on Inventions					
e. Technical Description of Project and Results				√	12/84
f. Other *(specify)*					

2. Principal Investigator/Project Director Name *(Typed)*	3. Principal Investigator/Project Director Signature	4. Date
James J. Swain		6/29/84